

Appl. No. : 09/586,666
Filed : June 1, 2000

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1. A prosthetic foot assembly for a lower limb amputee, comprising:
a prosthetic foot for attaching to a socket or pylon of the lower limb amputee,
comprising:
a lower foot plate including a symmetric toe configuration and a plurality
of slots formed therebetween;
an upper ankle plate having a length substantially shorter than said foot
plate;
an ankle block having a wedged configuration and comprising a
compressible material sandwiched between said foot plate and said ankle plate;
and
an outer cosmesis having a length approximately equal to the length of a natural
human foot and having an anterior toe region including a slot substantially aligned with
one of said slots of said foot plate.
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2. The prosthetic foot assembly of Claim 1, wherein said cosmesis further comprises
a reinforcement patch in said toe region.

4. The prosthetic foot assembly of Claim 1, wherein said foot plate is flexible.
5. The prosthetic foot assembly of Claim 1, wherein said ankle plate is flexible.
6. The prosthetic foot assembly of Claim 1, wherein said wedged configuration of
said ankle block comprises a downwardly and inwardly sloping rear face.
7. The prosthetic foot assembly of Claim 1, wherein said symmetric toe
configuration comprises an inner toe and two outer toes.
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8. The prosthetic foot assembly of Claim 2, wherein said reinforcement patch comprises a slot substantially aligned with said slot of said toe region of said cosmesis and one of said slots of said foot plate.

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11. A prosthetic foot for providing a smooth and generally life-like response to a wearer, comprising:

a foot plate comprising a plurality of symmetrically arranged spaced elongated toes;

an ankle plate positioned above said foot plate; and

a compressible block between said foot plate and said ankle plate and in mechanical communication with said foot plate and said ankle plate for transmitting forces imparted thereon by said foot plate and said ankle plate such that there is a smooth and natural rollover between heel-strike and toe-off as energy is cyclically stored and released in said prosthetic foot.

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12. The prosthetic foot of Claim 11, wherein said foot plate has a generally curvilinear shape.

13. The prosthetic foot of Claim 11, wherein said foot plate is capable of flexing along its length.

14. The prosthetic foot of Claim 11, wherein said foot plate comprises a vinyl ester based sheet molding compound.

15. The prosthetic foot of Claim 11, wherein said toes of said foot plate are slightly upwardly curved.

16. The prosthetic foot of Claim 11, wherein said foot plate comprises a middle toe and two outer toes.

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17. The prosthetic foot of Claim 16, wherein said outer toes are slightly inwardly curved.

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18. The prosthetic foot of Claim 11, wherein said ankle plate has an anterior section inclined in the direction towards said foot plate.

19. The prosthetic foot of Claim 11, wherein said ankle plate is capable of flexing along its length.

20. The prosthetic foot of Claim 11, wherein said ankle plate comprises a vinyl ester based sheet molding compound.

21. The prosthetic foot of Claim 11, further comprising a connector coupled to said ankle plate for facilitating attachment of said prosthetic foot to a socket or pylon of the wearer.

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22. The prosthetic foot of Claim 11, further comprising a strap generally circumscribing said foot plate, said ankle plate and said block to control the stretching of said block.

23. The prosthetic foot of Claim 11, wherein said block comprises a downwardly and outwardly sloping front face.

24. The prosthetic foot of Claim 11, wherein said block comprises a downwardly and inwardly sloping rear surface.

25. The prosthetic foot of Claim 11, wherein said block comprises a monolithic element.

26. The prosthetic foot of Claim 11, wherein said block comprises polyurethane foam.

27. The prosthetic foot of Claim 11, wherein said block comprises cellular foam.

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28. The prosthetic foot of Claim 11, wherein said block has a density between about 150 kg/m³ to about 1500 kg/m³.

29. The prosthetic foot of Claim 11, wherein said block has a density between about 300 kg/m³ to about 600 kg/m³.

30. The prosthetic foot of Claim 11, wherein exposed sides of said block are coated with a sealant.

31. The prosthetic foot of Claim 11, further comprising an outer cosmesis housing said foot plate, said ankle plate and said block.

32. The prosthetic foot of Claim 31, wherein said cosmesis comprises a toe region with a slot to form a big toe substantially aligned with one of said toes of said foot plate.

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33. The prosthetic foot of Claim 32, wherein said toe region of said cosmesis comprises a reinforcement strap.

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34. The prosthetic foot of Claim 33, wherein said reinforcement strap has a slot substantially aligned with said slot of said toe region of said cosmesis.

35. An artificial foot for providing a smooth and natural dynamic response during walking or running activities of a lower limb amputee, comprising:

a flexible lower foot plate having an upper surface and a lower surface, said foot plate comprising a toe section, an arch section and a heel section, said toe section comprising a plurality of toes spaced by a plurality of slots and a generally concave upward toe end, said arch section comprising a generally concave downward arch, said heel section comprising a generally concave upward heel end;

a flexible upper ankle plate having a top surface and a bottom surface and a length shorter than said foot plate, said bottom surface of said ankle plate being substantially

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parallel to said upper surface of said foot plate, said ankle plate being connected to an attachment member utilizing a bolt for facilitating attachment to a stump or pylon of the amputee, said bolt having a longitudinal axis defining an attachment axis generally aligned with the vertical centerline of an imaginary ankle; and

a resilient ankle member composed of a compressible material and sandwiched between said foot plate and said ankle plate, said ankle member comprising an anterior section and a posterior section, said anterior section having a downwardly and outwardly sloping front face, said posterior section having a wedge shaped cut to form a first rear face substantially parallel with said attachment axis and a second rear face inwardly and downwardly inclined with respect to said first rear face.

36. The artificial foot of Claim 35, wherein said toes are arranged in a symmetric configuration.

37. The artificial foot of Claim 36, wherein said toes comprise a center toe and two outer toes.

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38. The artificial foot of Claim 35, wherein said foot plate and said ankle plate comprise a vinyl ester resin matrix with a substantially randomly arranged fiberglass fiber content.

39. The artificial foot of Claim 35, wherein said ankle plate comprises a through hole in which said bolt resides.

40. The artificial foot of Claim 35, wherein said second rear face of said ankle member contacts said upper face of said foot plate at a contact axis to space said contact axis from said heel end of said foot plate by a predetermined amount to provide enhanced plantar flexion.

41. The artificial foot of Claim 35, wherein the angle between said first rear face and second rear face of said ankle member is about 60°.

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42. The artificial foot of Claim 35, wherein the angle between said first rear face and second rear face of said ankle member is between about 45° to about 75°.

43. The artificial foot of Claim 35, wherein the angle between said front face of said ankle member and a plane parallel to said first rear face of said ankle member is about 15°.

44. The artificial foot of Claim 35, wherein the angle between said front face of said ankle member and a plane parallel to said first rear face of said ankle member is between about 5° to about 45°.

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45. The artificial foot of Claim 35, further comprising a limit strap generally circumscribing a portion of said posterior section of said ankle member to control the maximum expansion of said posterior section of said ankle member.

46. The artificial foot of Claim 45, wherein said limit strap comprises natural tubular nylon webbing.

47. The artificial foot of Claim 45, wherein said limit strap comprises woven nylon.